Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCYD523	Supramolecular chemistry & Molecular recognition	3	0	0	3

Course Objective

The course aims to:-

- Demonstrate the importance of supramolecular forces for the assembly of complex nanomaterials
- Give an understanding of how the properties of ligands can be tuned in order to optimise the performance of metal complexes in their various applications.
- Examine the relevance of such Supramolecular systems to catalytic, biological, chemi-architectural, industrial processes and applications

Learning Outcomes

By the end of the course the student will be able to:-

- Develop an understanding of the importance of intermolecular forces to define the "chemistry beyond the molecules"
- Use the basic understanding of such forces to rationalise the formation of complex nanomaterials
- Understand the importance of the bottom-up approach to prepare complex systems.
- Recognize the main types of supramolecular assemblies and suggest synthetic strategies for their preparation.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Supramolecules: Supramolecular Chemistry and Molecular Recognition. Concepts, Definitions, Language, Receptor Design Principles. Supramolecular Interactions. Ion-ion interactions; Ion-dipole interactions; dipole-dipole -interactions; van der Waal interactions,π-π-interactions; cation-πinteractions; hydrogen bonding; hydrophobic effect; coordination bonds. Self-assembly processes in organic systems. Catenanes, rotaxanes, pseudorotaxanes. Synthetic strategies for their preparation. Examples of each type.	14L	Students will develop basic information about supramolecular chemistry and their impact in self assembling.
2	Self-assembly processes in metal-containing compounds. Using the coordination bond to prepare large supramolecular assemblies. Cages, macrocycles and catenanes. Polymeric materials and grids. Nano-capsules and containers. Synthetic strategies for their preparation. Examples of each type. Potential uses of such assemblies as nano-reactors and for transport. Host-Guest Chemistry. Hosts for Cation Binding; Host for Anion Binding; Hosts for the Binding of Neutral Guests;	20L	Develop understanding on the use of coordination bond to design and develop molecular cages, macrocycles, grids and capsules Develop understanding on the design aspect of the organic linkers and their applications.

	Synthetic consideration; Templation; Kinetic and Thermodynamic Aspects of Binding Selectivity. Kinetic and Thermodynamic Considerations; Helicates. Supramolecular Chirality. Supramolecular Reactivity and Catalysis. Supramolecular Catalysts; Enzyme Models. Self-Replicating Systems. Kinetic Models; Self-replication in nature; Artifical Self Replicating Systems.		
3	Molecular switches and machines. Use of supramolecular forces to assemble components that respond (on-off) to external stimuli. Molecular shuttles, abacus and muscles. Assembling such components into surfaces for molecular electronics. Supramolecular Aggregates and Assemblies.	8L	Develop understanding about the design aspects of molecular switches and molecular machines Develop understanding about the development of molecular electronics
TOTAL		**42**	

Text Books:

1. Supramolecular Chemistry, J. W. Steed and J. L. Atwood, J. Wiley and Sons; 1st Ed. 2000.
2. Control of Reactivity in Aggregates of Amphiphilic Molecules. P. Scrimin, in "Supramolecular control of Structure and Reactivity," John Wiley and Sons, 1996, Vol. 3, pp. 101-153.

Reference Books:

1. Principles and Methods in Supramolecular Chemistry, Hans-Joerg Schneider & A. Yatsimirsky, J. Wiley & Sons, 1st Ed. 2000